

During this survey, scats of tiger ( $n = 30$ ) and dhole ( $n = 37$ ) were collected opportunistically whenever encountered along roads and trails. Prey species hair remains from each scat were observed under a high magnification microscope and compared with reference slides at the research laboratory of Wildlife Institute of India, Dehradun.

Scat analysis revealed the presence of three prey species in tiger scats and five prey species in dhole scats. Percent occurrence of prey items in tiger and dhole scats was calculated. Tiger scats comprised of Sambar *Rusa unicolor* (78.8%), Rodent (18.4%) and Wild Pig *Sus scrofa* (2.6%), while dhole scats comprised of Sambar (51.6%) rodent (35.5%), Wild Pig (6.5%), Black-naped Hare *Lepus nigricollis* (3.2%) and bird (3.2%) remains. It is evident that tiger and dhole depend mainly on sambar as the major prey along with secondary prey species

like small mammals. In comparison to the deciduous forest, which is considered as a prey rich habitat with a much wider choice of large body-sized prey (Ramesh *et al.* 2009), the shola grasslands of Mukurthi harbour low density of prey species and absence of chital (a major prey in other tiger habitats) in the area. Large carnivores have the potential to survive even in low densities in Mukurthi National Park. Further comprehensive studies are needed to document food habits of large predators from montane sholas of India.

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### 3. THE SECOND LOCALITY RECORD OF *TAPHOZOUS LONGIMANUS* HARDWICKE, 1825 (CHIROPTERA: EMBALLONURIDAE) FROM NEPAL

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#### Introduction

Six species of Emballonuridae (*Saccolaimus saccolaimus*, *Taphozous longimanus*, *T. melanopogon*, *T. nudiventris*, *T. perforatus* and *T. theobaldi*) are recorded from the Indian subcontinent (Bates and Harrison 1997). The sole representative of the Family from Nepal is *T. longimanus*, six specimens of which were collected by R.M. Mitchell from Jhapa (26° 29' N; 87° 51' E) in the eastern Terai of Nepal in January, 1966 (Worth and Shah 1969; Mitchell 1978). In February 2009, a single dead male specimen of *T. longimanus* was found by the first author in Samrat Chowk, a suburb of Biratnagar, 56 km due west of Jhapa (Fig. 1). This is the second

locality record of the taxon in Nepal.

Nepal lies within the Himalaya Hotspot as defined by Conservation International ([www.biodiversityhotspots.org](http://www.biodiversityhotspots.org)) and both Biratnagar and Jhapa are located in the critical/endangered Global 200 terrestrial ecoregion number 91. Terai-Duar Savanna and Grasslands (Olson and Dinerstein 2002).

#### Material and Methods

The voucher specimen was transferred from the collection site to the Central Department of Zoology (CDZ), Tribhuvan University, Kathmandu, where it is retained as a

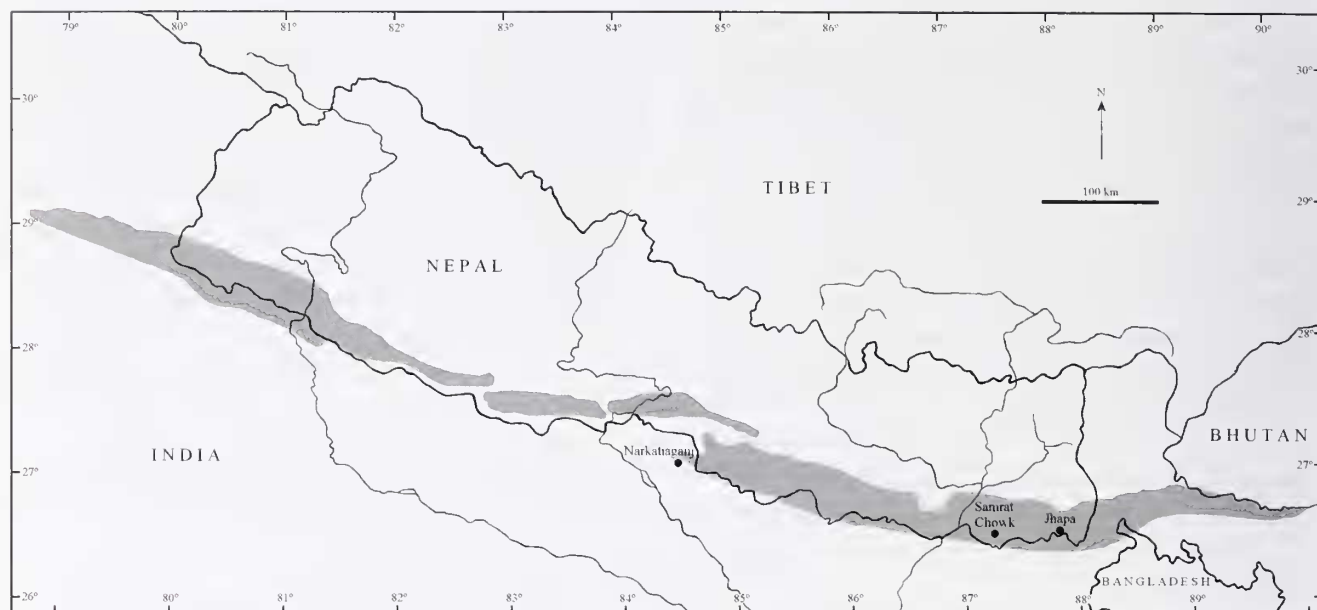


Fig. 1: Map showing the recorded distribution of *T. longimanus* in Nepal, the northernmost record of the species from Narkatiaganj in India, and the delineation of the Terai-Duar Savanna and Grasslands (shaded area)

**Table 1:** Selected external, cranial, and dental measurements of *T. longimanus* from Samrat Chowk, Nepal (to the nearest 1.0 mm) and of *T. longimanus* from India and Sri Lanka (to the nearest 0.1 mm)

	Samrat Chowk, Nepal (CDZ_BAT 7)	India and Sri Lanka (Bates & Harrison, 1997)			
		n	mean	range	n
HB	73.0	1	78.3	73.0 - 86.0	33
T	25.0	1	24.4	20.0 - 30.0	32
TIB	25.0	1	-	-	-
HF	12.0	1	11.5	8.0 - 14.0	30
FA	61.0	1	59.2	55.6 - 62.0	31
3mt	61.0	1	59.8	55.8 - 64.0	22
1ph3mt	22.0	1	21.6	20.4 - 22.7	22
E	18.0	1	17.2	16.0 - 19.0	33
GTL	22.0	1	21.4	20.2 - 22.0	29
CCL	19.0	1	20.0	19.2 - 21.6	30
ZB	12.0	1	12.5	12.0 - 12.9	27
BB	10.0	1	9.9	9.5 - 10.2	28
C-M3	9.0	1	8.9	8.7 - 9.2	32
c-m3	10.0	1	9.8	9.4 - 10.2	30
M	16.0	1	15.8	15.4 - 16.4	30

HB – head and body length; T – tail length; TIB – tibia length; HF – hindfoot length; FA – forearm length; 3mt – third metacarpal length; 1ph3mt – length of the first phalanx of the third metacarpal; E – ear length; GTL – greatest length of skull; CCL – condylo-canine length; ZB – zygomatic breadth; BB – breadth of braincase; C-M3 – maxillary tooththrow length; c-m3 – mandibular tooththrow length; M – mandible length.

wet specimen in 70% ethanol with the skull extracted. Fifteen external, cranial, and dental measurements were taken and these are presented in Table 1 together with comparative measurements of specimens of *T. longimanus* from India and Sri Lanka listed in Bates and Harrison (1997).

**Systematic Review**

*Taphozous longimanus* Hardwicke, 1825.  
Transactions of the Linnean Society of London, 14: 525.  
Type Locality: Calcutta (now Kolkata), India  
Common Name: Long-winged Tomb Bat

**Variation**

Bates and Harrison (1997) and Simmons (2005) refer all *T. longimanus* in the region to the nominate form, as the taxa *brevicaudus*, *cantori*, and *fulvidus* are no longer regarded as being distinct. Csorba *et al.* (1999) refer specimens from Nepal to the nominate subspecies on the same grounds.

IUCN (2010) status - Least concern (Bates *et al.* 2008).

**Material**

1 ♂ (adult): Reg No: CDZ\_BAT 7; Samrat Chowk (26° 28' 46.30" N; 87° 17' 8.18" E), Pokharia, Biratnagar-1, Nepal, 72 m above msl; 25.ii.2009, Coll. Thapa, S.B.

The collection site is located in the eastern part of the Terai-Duar Savanna and Grasslands (Terrestrial ecoregion IM0701; Global 200 ecoregion no. 91) (Fig. 1), which is a composite mixture of tropical and subtropical grasslands, savannas, and shrublands supporting mainly an Indo-Malayan fauna (WWF 2001).

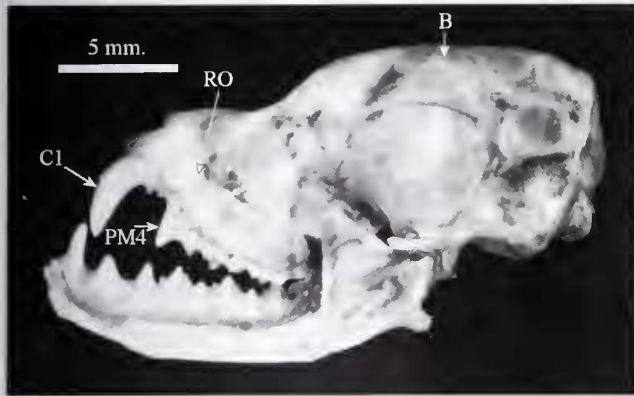


Fig. 2: The skull of CDZ\_BAT 7 showing the relative lengths of the upper canine (C1) and the second upper premolar (PM4) and the elevation of the braincase (B) above the rostrum (RO)



Fig. 3: Detail of the hindfoot and leg of CDZ\_BAT 7 showing the attachment of the wing to the ankle (arrowed) and the protrusion of the tip of the tail from the mid-point of the interfemoral membrane

### Diagnosis and Description

The specimen has a long third metacarpal (61 mm); a naked chin; a prominent gular sac; and a moderately developed radio-metacarpal pouch at the junction of the forearm and the fifth metacarpal. The wing is attached to the ankle. Fur on the dorsal and ventral areas extends approximately to one half the length of each humerus and femur; the wings are otherwise naked. In the skull, the braincase is elevated above the rostrum. In the dentition, the second upper premolar (PM4) is robust and extends roughly to three-quarters the height of the upper canine (C1) (Fig. 2).

One of the external diagnostic characteristics most helpful in distinguishing between the Emballonurid species known from the Indian subcontinent is the attachment point of the wing. In *Taphozous melanopogon*, *T. nudiventris*, *T. perforatus*, and *T. theobaldi*, the wing is attached to the tibia; in *T. longimanus* and *Saccolaimus saccolaimus*, it is attached to the ankle (Fig. 3). Characteristics that may be used to distinguish between the last two species include the chin, which is naked in *longimanus* but which is covered in short hairs in *saccolaimus*, and a radio-metacarpal pouch, which is present in *longimanus* (Fig. 4), but absent in *saccolaimus*.

### Ecology and Habitat

The bat was found dead on a road in Samrat Chowk, which is a small residential area of Pokharia located within Biratnagar Submetropolitan City Ward no. 1. Approximately 50 m from the road lies a small group of teak trees *Tectona* sp. The road terminates 1 km to the east of the collection site at the Singia river, where there is a wooded area dominated by the Indian Rosewood *Dalbergia sissoo*. Beyond the Singia river, there are large, open fields, in which rice *Oryza* sp. is

grown in summer and wheat *Triticum* sp. in winter. There are a few small areas of cultivated sugarcane *Saccharum* sp. Areas to the immediate north, south, and west of the collection site are dominated by buildings. The average annual daytime temperature range is 18-31 °C (DHM 2006) and the average annual minimum night-time temperature is 7.7 °C (Central Bureau of Statistics 2009). Annual rainfall is approximately 157 mm (DHM 2006).

Elsewhere in its range, *T. longimanus* has been collected from hollows in the trunks of banyan and peepal trees, the crowns of palm trees, the domed roof of a church (Sinha 1986) and from the partially sunlit eaves of houses (Wroughton 1913). The species has been observed to be a solitary forager, flying commonly at heights of 25 to 62 m with occasional fast, swooping runs close to the ground at sites of high insect activity (Pearch and Writer 2009). Sinha (1986) considered the species' favoured diet to be cockroaches and beetles.



Fig. 4: Right wing of CDZ\_BAT 7 showing the presence of a radio-metacarpal pouch (arrowed) and the extension of the fur to one half the length of the humerus



## Discussion

The collection of *T. longimanus* from Samrat Chowk represents the second record of the species, of the genus, and of Family Emballonuridae from Nepal. It is also the fourth most northerly collection locality of the taxon, the most northerly being Narkatiaganj (c. 27° 06' 30" N; 84° 27' 40" E) in India (Sinha 1986) (Fig. 1).

*T. longimanus* is a well-documented taxon throughout its range with 16 locality records alone in the adjacent Indian state of Bihar (Bates and Harrison 1997). The Chiroptera of Nepal and the small mammal fauna of the country in general, however, remain under-researched and this is evinced by the fact that *T. longimanus* is one of the 11 bat species (or 22% of Nepal's documented bat fauna) known from no more than two localities in the country. A further 14 bat taxa (28%) are known only by a single specimen or from just a single locality (Pearch *in press*).

Of the 50 bat species with substantive collection records from Nepal, only *T. longimanus* and *Murina cyclotis* are restricted exclusively to the critical/endangered Terai-Duar Savanna and Grasslands (Pearch *in press*). Although *T. longimanus* may not be directly affected by these changes, major and persistent threats to the ecoregion include the clearance of rare tall grasslands for agriculture, over-grazing, logging, erosion, poaching, and the diversion of watercourses for irrigation (WWF 2001). The main driver of such ecological disturbance is over-population, which is occasioned largely by the resettlement of workers from growing communities in highland areas, where human expansion is limited by

topographical constraints. Accordingly, research into methods of reducing such resettlement would be of tangible benefit to the endangered habitats in the southern part of the country.

With the recent improvements in access to many parts of the country, a tremendous opportunity presents itself to revitalise the study of the nation's fauna and it would seem sensible to suggest that surveys be undertaken to determine the small mammal composition of some of the country's more threatened areas, including the Terai, before the growth of habitat degradation gathers pace. This point was addressed by Pearch (*in press*), who propounded a series of recommendations for biodiversity assessments in protected and other areas of Nepal.

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